Before the
Federal Communications Commission
Washington DC 20554

In the Matter of

5GAA Petition For Waiver to Allow Deployment of Intelligent Transportation System Cellular Vehicle to Everything (C-V2X) Technology	))))	GN Docket No. 18-357

Comments of Cisco Systems, Inc.

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Summary

The Commission should dismiss the Petition for Waiver without prejudice. Proponents of C-V2X have provided information about radio parameters derived from lab and limited field testing, but have not provided information that would qualify C-V2X as a transportation safety technology delivering safety benefits equal to or superior to the incumbent technology, or other benefits long associated with V2X. Consequently, there is very little factual basis upon which the Commission can confer with the transportation safety regulator (i.e., the Department of Transportation and its component agencies) for views on whether the part of the band sought by C-V2X proponents should be declared off limits to the existing and deployed V2X technology. For this and other reasons, the petitioners have failed to meet their burden of proof under the Northeast Cellular standard that grant of the waiver would not undermine the policy which the rule is intended to serve – transportation safety and efficiency. Moreover, the relief sought – permanent, nationwide use of 5905-5925 MHz by a technology that cannot interoperate with existing, deployed systems -- cannot properly be the subject of a waiver proceeding and must be decided by rulemaking. Finally, Cisco suggests that proponents be directed to further develop their technology under the very generous and flexible Experimental Licensing rules, which would help inform transportation regulators not just about the radio parameters, but more importantly whether this new radio system reaps safety and efficiency benefits at least equal to the incumbent technology.

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Comments of Cisco Systems, Inc.

I. Introduction and Summary

Cisco Systems, Inc. (Cisco) hereby files its comments in the above-captioned proceeding urging the Commission to dismiss without prejudice the Petition for Waiver filed by the 5G Automotive Association (5GAA).[1] First, 5GAA has failed to meet the burden of proof required to support a successful waiver.[2] There is simply insufficient evidence brought forward in the wavier petition that C-V2X will create a safer and more efficient transportation system, which is the policy the Commission cited as the reason to create the existing rules. Second, the requested

[1] *Office of Engineering and Technology and Wireless Telecommunications Bureau Seek Comment on 5GAA Petition for Waiver to Allow Deployment of Cellular Vehicle-to-Everything (C-V2X) Technology in the 5.9 GHz Band*, Public Notice, DA 18-1231 (OET/WTB Dec. 6, 2018) and *Office of Engineering and Technology and Wireless Telecommunications Bureau Extend Comment Cycle Deadlines on 5GAA Petition for Waiver to Allow Deployment of Cellular Vehicle to Everything (C-V2X) Technology in the 5.9 GHz Band*, Public Notice, DA 18-1310, (OET/WTB Dec. 31, 2018). This comment is being filed on February 8, 2019 pursuant to instructions from the Public Notice, "Revisions to Filing and Other Deadlines Following Resumption of Normal Commission Operations," DA 19-26, released January 29, 2019.

[2] *Northeast Cellular Tel. Co. v. FCC*, 897 F.2d 1164, 1166 (D.C. Cir. 1990), citing *WAIT Radio v. FCC*, 418 F.2d 1153, 1157,1159 (D.C. Cir. 1969).

relief would, if granted, amount to a permanent change in the rules negatively impacting every existing licensee for the 5905-5925 MHz band, as well the vendor community supporting that band, by allowing an incompatible and non-interoperable technology to be introduced with exclusive rights or superior rights to existing technology. Grant of a permanent rule change via a waiver proceeding, instead of a rulemaking proceeding, sets a difficult and potentially dangerous procedural precedent with respect to any number of future issues the Commission may need to address.

While Cisco is a vendor to public transportation authorities around the country, offering a Connected Roadways solution that for some time has included V2X roadside units, Cisco itself has no technology religion and does not oppose the continuing developing of C-V2X or for that matter, future 5G technologies, to address transportation safety. When fully developed and tested, these technologies may prove superior to the existing one.

That said, the Commission has a job to do – one defined by administrative law when 5GAA chose to file its Petition for Waiver. In Cisco's view, every technology company has a stake in how the Commission addresses the relief requested. Simply put, if granted as presented, the Petition would set wholly new, and in Cisco's view, dangerous precedent for administration of the Commission's rules and introduction of new technology. Grant of the waiver, based on the facts presented by the petitioner, amounts to a rule change that would deny access to two of seven radio channels supported by the incumbent technology that Cisco is itself actively marketing. For that reason, Cisco has elected to comment.

While petitioners urge the Commission to allow its preferred technology to displace the incumbent one in 20 MHz of the ITS band, and do so based on claims that its technology is better, it would be a mistake for the Commission to treat this issue as the 5GAA Petition urges it to do – a technology beauty contest. Rather, the Commission's role is to look hard at the facts presented by 5GAA and other commenters, consider the reasonable and lawful application of administrative law, and evaluate whether the proponents have achieved the burden of proof required for a waiver. It also must consult and reach consensus with transportation regulators who have subject-matter jurisdiction over vehicle safety, because the relief here displaces the existing solution. Once the Commission performs this review, Cisco believes the waiver petition will come up short. We recommend it be dismissed without prejudice, and without any negative inference associated with the technology. While proponents of the technology should be given a clear signal that they cannot ignore administrative procedure to favor their preferred solution, they should simultaneously understand there is no Commission impediment to continue to develop their preferred approach.

Cisco is a leading provider of IP-based technologies, solutions and services. Cisco is a San Jose, California based Fortune 100 firm with a global presence, and counts among its customers a significant number of transportation interests of all types. Pertinent to this docket, Cisco offers Connected Roadway solutions to various transportation authorities, such as state Departments of Transportation.[3] Connected Roadways is a solution set that, among other things, includes 5.9 GHz V2X radios authorized under the Commission's rules for Dedicated Short

[3] https://www.cisco.com/c/en/us/solutions/industries/transportation/connected-roadways.html

Range Communications (DSRC). In addition, Cisco authored a reference architecture that highway authorities could use to think about how roadside units, and the data flowing through them, could be integrated into the enterprise's IP networks, including other technologies those agencies may wish to utilize along roads. Our customers are deploying Connected Roadway solutions to obtain the data necessary to innovate across a range of safety and efficiency goals – such as safer intersections and more efficient targeting of road treatments to address ice and snow. What they have seen, and contrary to conventional wisdom, is that large deployments of onboard units in private vehicles are simply not required to generate safety benefits from existing V2X. As our customers have learned, equipping publicly-owned fleets of trucks, buses and other vehicles is enough to supply the data needed to make smarter and safer decisions about roadways.

As discussed above, Cisco advises the Commission to dismiss the above-captioned waiver without prejudice. Proponents of C-V2X have provided information about radio parameters derived from lab and limited field testing, but have not provided information that would qualify C-V2X as a transportation safety technology delivering safety benefits equal to or superior to the incumbent technology, or other benefits long associated with V2X. Consequently, there is very little factual basis upon which the Commission can confer with the transportation safety regulator (i.e., the Department of Transportation and its component agencies) for views on whether the part of the band sought by C-V2X proponents should be declared off limits to the existing and deployed V2X technology. For this and other reasons, the petitioners have failed to

meet their burden of proof under the Northeast Cellular standard[4] that grant of the waiver would not undermine the policy which the rule is intended to serve – transportation safety and efficiency.[5] Moreover, the relief sought – permanent, nationwide use of 5905-5925 MHz by a technology that cannot interoperate with existing, deployed systems -- cannot properly be the subject of a waiver proceeding and must be decided by rulemaking. Finally, Cisco suggests that proponents be directed to further develop their technology under the very generous and flexible Experimental Licensing rules, which would help inform transportation regulators not just about the radio parameters so proudly shared in this waiver petition, but more importantly whether this new radio system reaps safety and efficiency benefits at least equal to the incumbent technology.

[4] *Northeast Cellular Tel. Co. v. FCC*, 897 F.2d 1164, 1166 (D.C. Cir. 1990), citing *WAIT Radio v. FCC*, 418 F.2d 1153, 1157,1159 (D.C. Cir. 1969).

[5] The Commission summarized the creation of the Intelligent Transportation System Band in a 2006 order as follows: "The ITS program was created by Congress in the Intermodal Surface Transportation Efficiency Act of 1991, and is administered by the Department of Transportation (DOT). The program uses advanced electronics to improve traveler safety, decrease traffic congestion, facilitate the reduction of air pollution, and conserve vital fossil fuels. Pursuant to the Transportation Equity Act for the 21st Century, the Commission, in consultation with the DOT, allocated the 5.850-5.925 GHz band to DSRC in October 1999. On November 7, 2002, the Commission adopted a Notice of Proposed Rule Making (NPRM) seeking comment on proposed DSRC service rules in the 5.9 GHz band, and on December 17, 2003, it adopted the DSRC service rules. In the Matter of Amendment of the Commission's Rules Regarding Dedicated Short Range Communications System Rules in the 5.850-5.925 (5.9) GHz Band, WT Docket 01-90, Memorandum Opinion and Order, released July 26, 2006 at para. 2 (footnotes omitted; emphasis added).

II. The Waiver Petition Fails the Northeast Cellular Waiver Standard and Cannot Be Granted

In a Petition for Waiver of existing rules, proponents must make a very specific showing.[6] In a waiver proceeding, the Commission will waive its rules in specific cases only if it determines, after careful consideration of all pertinent factors, that such a grant would serve the public interest without undermining the policy which the rule in question is intended to serve.[7] In a waiver proceeding, if the waiver is granted, the existing rule remains in place. The parties who receive the waiver relief are then allowed to operate pursuant to the waiver authority, instead of the existing rules.

A. Grant of the Waiver Adversely Impacts Existing V2X Deployment, Undermining Safety

As an active player in the existing V2X marketplace, Cisco is of the view that grant of the waiver would have a significantly adverse, if not devastating, impact on V2X deployment. Grant would provide less predictability for stakeholders, significantly increase uncertainty, and will not at this time yield greater spectrum utilization relative to the progress being made with the incumbent technology. We believe that grant of the waiver does not, therefore, support the underlying policy.

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[6] 47 C.F.R. §1.3. In contrast, rulemaking petitions are filed under a different rule, namely, pursuant to Section 1.401 of the Commission's Rules, 47 CFR §1.401, and are conducted under different procedures and decisional standards.

[7] *Northeast Cellular Tel. Co. v. FCC*, 897 F.2d 1164, 1166 (D.C. Cir. 1990), citing *WAIT Radio v. FCC*, 418 F.2d 1153, 1157,1159 (D.C. Cir. 1969).

At the outset, it must be emphasized that C-V2X was developed to be non-interoperable with existing V2X. For this reason, the 5GAA proposed rules would disallow DSRC operations in the 5905-5925 MHz band. What is not observed in the Petition is that this is a choice that proponents made at the time they developed standards for C-V2X. They made a decision to bring forward a non-interoperable technology. This decision, therefore, has a significant impact – not just on whether C-V2X radios can occupy the requested spectrum, but whether the existing radios deployed in the band today would continue to be legal if the waiver is granted. The existing V2X radios are designed, and have been approved, to operate in all seven of the ITS channels, including two channels – 182 and 184 – that occupy 5905-5925 MHz. Those existing radios do not lose capability should a waiver be granted – they have the capability to operate using channelization and rules that would no longer permit their operation for 5905-5925 MHz.[8]

As a matter of radio equipment authorization practice, the Commission would not allow radios to be approved for marketing if they had the capability to operate in a band in a way at odds with band requirements. But that is exactly what would happen here in that existing radios would be able to transmit in ways not consistent with the rules 5GAA is advocating for 5905-5925 MHz. This impacts an unknown and growing number of radios deployed by over 70 licensees as roadside units, as well as onboard units in private vehicles and public fleets. Moreover, it is quite possible that all approved V2X radios in the supply chain on their way to market today, would either be written off as a loss, or would need to be significantly modified, a

[8] Cisco is not suggesting that operators of roadside units would intentionally operate existing V2X radios using Channels 182 and 184 if the waiver was granted, but the opportunity for confusion is clearly present.

result that the smaller radio manufacturers would find highly detrimental to their balance sheets. In addition, V2X radio technology under development today (i.e., radios that do not yet have an FCC ID), which are being developed under existing DSRC rules, would have to be changed and likely delayed or abandoned. While it may be possible as a legal matter to grandfather radios installed as of a date certain, the C-V2X proponents are clear that the two systems cannot interoperate co-channel and would cause interference to each other. The alternative to grandfathering – again, not addressed by the Petition – is to "rip and replace" existing radios and to re-install five-channel V2X radios that would not transmit on channels 182 and 184. The size of the effort, its cost both direct and in the form of opportunity cost on licensees and others, would need to be considered in deliberations on this petition.

Rendering existing V2X radios illegal comes at a time when V2X implementations have been growing. Auto manufacturers and state highway officials are voluntarily stepping up to implement radio-based safety, utilizing DSRC, in commercially-available vehicles.[9] At DSRC deployment sites around the country,[10] taxis, government-owned vehicular fleets of various

[9] GM and Toyota are the two manufacturers whose decision to deploy DSRC are most cited, and Toyota alone sold over 2.4 million vehicles in North America in 2017. In Europe, Volkswagen has announced deployment for its complete line up of vehicles for 2019. Honda has also recently publicized its testing of DSRC equipped intersections. See https://www.digitaltrends.com/cool-tech/honda-smart-intersection-marysville/ and https://www.tu-auto.com/honda-safe-swarm-v2x-tech-looks-dsrc-facing/.

[10] Written Statement of Shailin P. Bhatt, President and CEO of ITS-America before the House Transportation Committee, September 5, 2018 at https://static1.squarespace.com/static/596fb16003596e0fa70a232f/t/5b8fc626352f53909ed5e4ef/1536149031541/ITSA+Shailen+Bhatt+Testimony+House+Highways+and+Transit+Subcommittee+Innovation+in+Surface+Transportation+Hearing+09.05.18.pdf. See also Coalition for Safety Sooner Ex Parte, ET Docket No. 13-49, January 23, 2018 (statements by various state highway officials on the importance of DSRC and current deployments).

types, buses, and private vehicles (including delivery vehicles) are being equipped with after-market radios.[11] In addition to vehicle-to-vehicle crash avoidance, broader radio-based applications for road safety are also emerging. For example, the New York City deployment is using the vehicle-to-vehicle channel (Channel 172) to control speeds of equipped vehicles and manage intersections, in addition to supporting vehicle-to-pedestrian applications. Las Vegas, Nevada is deploying DSRC roadside and in onboard units to control congestion at intersections and enable collection of data to help address accidents.[12] Michigan, Ohio and Pennsylvania have been part of a tri-state "Smart Belt" initiative that is looking to advance ITS architectures such as DSRC. In addition to truck platooning, the Ohio project is addressing efficient deployment of snow and ice abatement materials.[13] AASHTO has initiated web-based resources that, among other things, enable states to collaborate and learn from deployments.[14] These are all examples of deployments of the DSRC seven channel system. A declaration that the radios supporting these activities are now illegal would not just set the clock back years, but would create a new and substantial burden for agencies to acquire new radios and replace existing radios that would support the two technologies in the associated sub-bands.

[11] https://www.its.dot.gov/factsheets/pdf/NYCCVPliot_Factsheet_020817.pdf https://www.its.dot.gov/pilots/cv_tech_tampa.htm

[12] https://www.lightreading.com/smart-cities/las-vegas-bets-on-a-new-network-edge/d/d-id/740240

[13] https://www.roadsbridges.com/steering-future-right-direction

[14] https://transportationops.org/spatchallenge

In addition, the Petition leaves unaddressed the question of what happens to Channel 184, the Public Safety channel. This also undermines the claim that C-V2X will deliver improved safety and other benefits. In the 5GAA proposal, there is no comparable Public Safety use of the 5905-5925 GHz band. Indeed, based on information in the Petition, it appears that 5905-5925 MHz may be initially intended for V2V communications, as the only firm that has firmly announced plans for it would use if for peer-to-peer communications between vehicles. Yet in the existing V2X technology, this is the spectrum that public transportation authorities, such as state highway departments, utilize for fleet data communications, and operates on higher power than the other six channels. Should Public Safety Channel 184 disappear if the waiver is granted, then it would presumably be up to the community interested in the existing V2X technology to reconstitute it – or not – within the remaining spectrum. Ideally, industry would need to reach new consensus on the channel plan for the incumbent system, although the forum for that conversation and the time needed to reach consensus is uncertain, and would be further confused should 5GAA make good on its intent to file a Petition for Rulemaking to revise rules for most of the band. Cisco urges the Commission to weigh heavily the views of state highway departments and similar entities in this proceeding.

Finally, the claim of rapid benefits to be gained if the waiver is granted appear to be further undercut by the evolution within the 3GPP standards effort of standards for the band. Cisco understands that 5G developers have set a goal of making the 5G version backward compatible with C-V2X, so that vehicles with Release 14 radios can interact with vehicles with Release 16 radios. But, as we understand it, co-channel coexistence between the two generations of technology is not something currently being evaluated in standards discussions. Therefore, the

consequences of deploying C-V2X, and then subsequently 5G -- for spectrum use, channel plans, and users -- are completely unknown. State highway departments and federal transportation regulators cannot be expected to guess at the future evolution path for networks from a technology standpoint.

B. Waiver Petition Fails To Provide Data to Support the Claim that C-V2X Is An Improvement Over DSRC Warranting Relief

1. Data provided about C-V2X is limited to radio parameters; no data enables ultimate conclusions about whether C-V2X would deliver improved safety, even in peer-to-peer mode

The Petition discusses at great length the radio parameters for C-V2X, which is information that is interesting and promising, but fails to answer the ultimate question – will it deliver safety and efficiency results at least as strong as the existing V2X technology? For example, we have now learned that C-V2X radios have a longer range than radios developed under the DSRC rules. In Cisco's view, this is neither good news or bad. If extended range assists in averting collisions, then it is good. If extended range results in too many vehicles attempting to communicate in a small area such that transmissions are not received (e.g., congestion), then it is bad. In fact, congestion management was one of the top reasons why the existing V2X technology ended up with the range that it did. But the Petition not only fails to provide an answer, the only thing we learn about congestion is that the issue is unresolved as a technical matter. The statements on this issue refer to an *anticipated future* state:

> As demonstrated more fully in the 5GAA Test Report, testing indicates that C-V2X can implement communications congestion control in accordance with the industry standard specified by the SAE, which was designed specifically for DSRC. By employing additional congestion management techniques, C-V2X is

likely to demonstrate performance that exceeds the SAE standards.[15]

The Test Report in Appendix B states:

> The data showed that the PER performance of high-priority BSM is noticeably better than lower-priority messages when high attenuations are used, or reception signals are weak.
>
> The reason is that high-priority safety messages can be protected more efficiently for channel-congested and collision scenarios by the C-V2X resource selection algorithm. For actual highly congested deployment scenarios, we *expect* this packet reception improvement of high-priority BSM to translate to noticeable and meaningful reliability improvement of critical safety messages.[16]

In fact, at page B-10 of the Test Report attachment (or page 9 of the Test Report), we see that congestion has been tested only in the lab - not yet in a controlled field environment, or in a situation approximating everyday driving, or even in a situation of extreme congestion. In Cisco's view, given that consequences of granting the waiver to the existing V2X ecosystem are so dire, much more work would have to be done to determine if the improved ranges discussed in the waiver represent true benefits or unwanted burdens. Unfortunately, the "we promise you C-V2X is better technology" taints most of the benefits cited in the petition – non-line-of-sight performance, reliability, and congestion control.[17] The Commission should not rely on any of this argumentation to support a waiver request.[18]

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[15] Petition for Waiver at 13 (emphasis supplied).

[16] Test Report at B-9 (or page 8), Section 4.1.3 Channel Congestion (emphasis supplied).

[17] Petition for Waiver at 14.

[18] In Cisco's view, at a minimum there should be some data provided to the Commission that enables the Commission to have an informed conversation with transportation regulators about whether C-V2X produces crash avoidance results comparable to or better than the existing V2X technology. Radio parameters are not enough.

For example, Cisco understands from standards documents that C-V2X can be operated using 10 MHz or 20 MHz wide channels. We further understand that a single channel can support the Basic Safety Message and other applications, such as platooning. In an uncongested environment, there would likely be enough time slots to enable both the Basic Safety Message and other activity. However, the Test Report contains no information about what happens when there is traffic congestion, such that more Basic Safety Messages are being transmitted within the receiver range. This congestion issue raises questions that are of importance to understanding how the technology works: (1) do the Basic Safety Messages have priority over other applications and what happens to the data communications supporting those other applications? This could be critical if the other application is platooning. (2) Is the proposal by 5GAA to use two 10-MHz wide channels or one 20-MHz channel? All the test reports are at 10 MHz, although there is a suggestion that further work will be done to examine the operation of a single 20-MHz channel. The proposed rules do not specify. If 20 MHz wide channel use is contemplated, the Commission should want to receive test data in support of a 20 MHz wide channel.

2. There is no data to explain the impact on adjacent DSRC channel operations

The Petition appears to take the view that C-V2X can be authorized to operate down to 5905 MHz with an out of band emission requirement. While a lot of data is provided about how C-V2X can withstand interference received from others, there is no information provided on the impact to DSRC of C-V2X operation up to the band edge of 5905 MHz. Specifically, there is no data presented in the Test Report to illuminate the impact of C-V2X operation on adjacent DSRC

operation in Channel 180.[19] While the Appendix appears to provide band edge protection at 5905 MHz, because the radio systems are different, there needs to be an examination of DSRC receiver performance in the face of adjacent channel C-V2X transmission. The core issue is not whether there will be energy in Channel 180 (there will be), but whether the energy compromises the expected use cases of Channel 180, including safety applications. This would be further complicated to the extent the transportation community seeks to relocate the public safety functions now on Channel 184 to Channel 180, a move that would least compromise Basic Safety Messages now being transmitted on existing V2X Channel 172. At a minimum, the burden is on the moving party to demonstrate that the impact of a grant would serve the public interest – this 5GAA has failed to do by ignoring the impacts to adjacent operations.

3. Appendix B's test report contains an unpersuasive analysis of C-V2X operations in the presence of an interferer.

Appendix B provides an irrelevant analysis of alleged superiority in C-V2X operations versus DSRC in presence of interferer. Essentially, the test described amounts to turning on a signal generator with constant noise across a 10 megahertz wide channel. The test concluded C-V2X is superior to DSRC. Cisco would fully expect that to be true, because DSRC, as a member of the IEEE 802.11 family, performs a clear channel assessment before transmission – it listens to decide if the band is clear before it sends a transmission. If you put enough noise in a DSRC

[19] Channel 180 in DSRC would be operated by the infrastructure entity, such as a state highway department. Cisco is of the view, based on our engagements with customers, that Channel 180 could well be used for safety and/or efficiency purposes, such as Vehicle to Pedestrian. In the US, the channel is either 10 MHz wide or is part of a 20 MHz wide channel. We further note that if this waiver is granted, there would no longer be an option for a 20 MHz wide channel above the control channel. This further undermines the view that introducing a new technology will not undermine the policy behind the existing rules.

channel, DSRC will not transmit. It will simply wait, continuing to assess the channel. This works perfectly well in an all-DSRC environment where transmissions are short and bursty, giving every transmitter the opportunity to talk. Therefore, the "test" of DSRC in the presence of an interferer simply confirms that DSRC includes the listen before talk feature set of IEEE 802.11 devices. But the test is irrelevant for a second reason. The constant transmission behavior used by the test does not reflect what will happen in the real world, because interfering signals will have bursty behavior. As a result, the test tells us nothing, and no conclusions can be drawn from it. This, too, undercuts the claim of superior "reliability" of C-V2X.

4. Operation where neither GNSS or infrastructure are available

The C-V2X system, based on Release 14 documents, relies on Global Navigation Satellite System (GNSS) signals for timing of transmissions, including timing of transmission in peer-to-peer mode. For most driving conditions, that would appear to be a reasonable choice. But there is no examination in the Test Report of what happens to timing if there is no GNSS or other infrastructure available to the system. Such a situation could occur, for example, when there is a traffic jam in tunnels and in areas where there are obstacles blocking the GNSS signals, such as urban canyons, forests, or rural topologies where the GNSS signals are not available. Our understanding is that, if this were to occur, timing would degrade, because the satellites cannot continuously refresh timing. These are not issues raised by the existing V2X system, because it does not rely on satellites for timing.

5. Significant uncertainty and lack of clarity surround the request

It is important to understand that, in this case, there is not a simple trade off of one technology for another. There are critical business model issues that stakeholders consider to be as important as the technology that provides the data. For example, the Waiver Petition notes that C-V2X is being developed with the idea that vehicle to vehicle communication would be offered on a peer-to-peer basis between radios housed in vehicles. The Waiver Petition is very specific that "no subscription" to a mobile carrier would be required for the peer-to-peer accident avoidance technology to operate. From an OEM perspective, then, C-V2X is no different from the existing V2X solution which also requires no payment to operate. But from a public transportation authority perspective, the statement has enormous – and unanswered – implications for how radio-based technology can be deployed. If, as the statement may imply, the business model for C-V2X (or the 5G system that will follow it), requires vehicle owners to pay for a mobile carrier subscription for communications other than peer-to-peer transmissions, then it would appear entirely likely that the C-V2X system will be relegated to those vehicle owners who can afford C-V2X and agree to whatever future terms and conditions are associated with the use of their data. To what extent such a business model would permeate the market, and whether the level of adoption would be more or less than DSRC, is unknown, and Petitioners offer no views on the topic.

Moreover, the Petition refers to the "benefit" of having some of the C-V2X or 5G infrastructure operated by mobile carriers. If that is true, what consequences flow to government stakeholders from not having data directly flowing into network infrastructure owned and operated by them? Data availability and terms and conditions are only one piece of the puzzle.

What differences exist between the two models when a state highway department seeks to deploy along a specific stretch of roadway? These are not necessarily problems, but they are differences which could impact the benefits of the band in significant ways. While these are not matters under the Commission's jurisdiction, it is very hard for stakeholders to understand the full parameters of the spectrum request to displace the existing technology in favor of C-V2X without some understanding of what the differences might be. The issue at the core of the waiver is far more than a technology beauty contest.

For the reasons stated above, proponents have not met their burden under Northeast Cellular to demonstrate that grant of the waiver would not undermine the policy which the rule is intended to serve. This is not a conclusion about the technology, but about the procedural vehicle that 5GAA utilized, the showing it made, and the relief it requested. Grant of the waiver would undermine the safety and efficiency goals which V2X is addressing today, and the data submitted in support of C-V2X fails to demonstrate that it is as good or better than the existing technology. Given that grant of the waiver would displace the existing V2X technology from a key part of the band, the Commission must dismiss the waiver request.

III. The Petition for Waiver Is a Rulemaking Request And Invites the Commission To Proceed Under the Wrong Rule Section

As an initial matter, 5GAA waiver request is made on behalf of a specific group of corporate entities – its members. In a typical waiver proceeding, waiver relief is specific to those who obtained relief and is not generalizable. Indeed, administrative law stipulates that if waiver relief is applied to all, then the relief amounts to a change of rule, not a waiver. If the proposed

revised rules for 5905-5925 MHz are available to all (as the Petition appears to suggest they would be), and exclude the incumbent technology, then the relief requested appears to be a rule change. If the new rules are only available to moving parties, then this result has consequences for 5GAA's "benefits" calculus that should be taken into account by the Commission in its review.

The Petition for Waiver requests relief – to supplant the existing rules governing 5905-5925 MHz -- with the set of rules based on technical parameters in Appendix D. The incumbent technology would be barred from operating at these frequencies, with the suggestion that the incumbent technology could operate from 5850-5905 MHz. There is no limitation on the relief. It is not temporary. Regardless of how it is styled by proponents, Petition for Waiver is in reality a Petition for Rulemaking, as what is posited is a rule change for 5905-5925 MHz that impacts current licensees, users and vendors. In a waiver proceeding, if the waiver is granted, the existing rule remains in place. The parties who receive a waiver are then allowed to operate in a way that is not in compliance with the existing rules, while everyone else operates pursuant to the existing rule. That is factually not what 5GAA has requested. 5GAA simply wants a rule change for a portion of the band, and does not want to engage a Petition for Rulemaking, apparently for reasons of speed. A Petition for Rulemaking is coming, it says, but it wants to change the rules now.

The Petition for Waiver must be dismissed. Granting such a request would create very difficult precedent that would raise a host of problems for the Commission to manage going forward. While the applicant may be impatient, impatience is not a reason to fail to utilize the

correct administrative procedure. Moreover, new technology comes along all the time. If a new technology developer believes it can displace another technology in a band by simply requesting a waiver that blocks an incumbent technology, that raises significant new risks for spectrum licensees, users and manufacturers. Decades of Commission precedent, based on administrative law, require that when a party or group of parties wants rules to be changed, the only procedural option is a rulemaking. The Commission would be well advised to hew closely to this precedent.

IV. Use of Experimental Licenses to Develop C-V2X Is A Better Choice

Given the maturity of the C-V2X technology, and how little is presently known about its efficacy as a system to deliver safety and efficiency outcomes, an experimental license or licenses would have been a better choice than a waiver or rule change. 5GAA and proponents would have been well served by requesting experimental authority in a geographical jurisdiction(s) that has not implemented DSRC. [20] Experimental authority provides ample flexibility to develop and test, up to and including product marketing. Multiple entities could apply and participate in the same geographic area. Applicants could have created a geographic "innovation zone" for example, that allows C-V2X proponents to test the technology in real-

[20] Since the Petition was filed, Ford Motor Co. announced that it would like to deploy C-V2X in 2022 model year vehicles, but only if the regulatory environment is conducive. As Cisco has previously explained, from an OEM greenfield perspective, the choice between C-V2X and the existing V2X technology is a question of pure technology preference – an OEM could install onboard units supporting C-V2X, DSRC or both. But there are larger questions presented here – whether there is data to show C-V2X is as good or better than DSRC in achieving the identified objectives, whether the infrastructure to support C-V2X will be built and based on what business model, adverse impacts to the market momentum for DSRC, impacts to adjacent V2X operations below 5905, whether this 20 MHz will be utilized for other than peer-to-peer applications, what happens to radios operated under today's rules -- to name a few.

world conditions.[21] Experimental authority can be granted to a wide variety of applicants, and is good for 2 years with up to a 5-year extension possible. This experimental authority would appear to satisfy the needs of the C-V2X proponents in continuing to develop and test C-V2X technology and build support for it in the larger transportation community. In dismissing the petition for waiver, Cisco suggests that the Commission direct the C-V2X proponents to the experimental licensing regime.

V. Conclusion

For the reasons stated above, Cisco urges the Commission to dismiss the above-captioned Petition for Waiver without prejudice.

Respectfully submitted,

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[21] 47 CFR Section 5.313.